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AUTHOR	Little, Dennis
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ABSTRACT

A secondary-level simulation designed to demonstrate the impact of policy, values, and technological and societal developments upon the quality of life within a hypothetical state is described. See related document ED 064 865 for availability of the actual game. By simulating the evaluation of policies in terms of social indicators, STAPOL (State Policy) provides insight into the possible future application of such indicators in real-world policy planning and analysis. Participants play the roles of state legislator, societal evaluator, or exogenous-event assessor. From the point of view of these roles, each player is concerned with the ongoing quality of life including environment, health care, education, culture, and standard of living. The actual play of the game focuses on the attempts of the state legislators to increase, through legislative actions, the level of quality of life. The index levels of this quality, in turn, are set by the combined efforts of the societal evaluators, who judge the impact of legislative actions on various societal groups, and the exogenous-event assessors, who determine how certain societal and technological events affect conditions independent of the actions of the planners. Learning objectives and suggestions for how the game can be used are included. (Author/DE)

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SOCIAL INDICATORS, POLICY ANALYSIS AND SIMULATION

Dennis Little

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Currently, academics and politicians talk of the need to develop social indicators to measure the quality of life and to reassess social priorities and goals. One possible tool for building a bridge between the conceptual model of social indicators and the operational model is simulation, which allows exploration of new policy options. This article deals with the need for such a simulation model, describes one such model (STAPOL) and discusses some current and future applications for this type of simulation.

During the past two decades, people in the USA seem to have become less happy.[1] During the same period, the phrase 'quality of life' has begun to appear with greater frequency and to replace the old terms 'happiness' and 'welfare' in contemporary discussions of policy in the urban and domestic areas. Currently, academicians and politicians talk of the need to develop social indicators to measure the quality of life and, related to this, the need to reassess social priorities and goals.[2]

It used to be that many people equated such economic indicators as GNP, *per capita* income, etc, with their quality of life. However, while GNP has kept rising, many people have remained hungry and unemployed. Our cities have remained congested and dirty. In many of our larger cities, the police and the community are seen as the invader and the invaded. Some people are beginning to ask why we must always think in terms of GNP, when a rise in the GNP may not affect the poverty, hunger, and unemployed or sub-employed status of the nation's rural and urban poor—our white, black, and brown neighbours. Why are the nation's social problems increasing in magnitude, complexity and number while our system of higher education (supposedly intended to provide training in problem solving) is educating more and more individuals every year?

Social indicators are measures of performance in many societal areas. They are intended to shed light on the impact of specific programmes, where we stand, and what changes are occurring in values and goals. Indicators should reflect both the primary and secondary impact of our policy choices, particularly because the secondary impacts of a policy action on the social indicators

At the time of the writing of this article Mr Little was a Research Associate with the Institute for the Future, Middletown, Connecticut. He is currently Commissioner, Office of Income Maintenance, Department of Public Welfare, Commonwealth of Pennsylvania, USA.

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for certain societal sectors may be more negative than the positive primary impact on the indicators for other societal sectors. Some say our federal highway programme in the 1950s and 60s was one example of this.

To establish meaningful social indicators, it is first necessary to establish goals of some type. The indicators then measure progress toward or away from the stated goals. Goals may be defined as those objects of aspiration which reflect a general nation- or state-wide concern and are invested with an element of consensus.

Any investigation of goals and indicators must consider which groups hold what goals, how the goals are priority-ordered, and how these distributions and orderings are changing with time. It is likely that any comparison between the national goal studies of 1960[3] and 1970[4] with the aspirations and policy recommendations of the Black Caucus in the House of Representatives would reveal significant disparities.

The problem of goal change over time is particularly troublesome. As goals become upgraded, future policies must be developed in terms of likely future goals. In part, goal changes reflect value changes, and in part, aspirations towards possible futures. As a nation moves closer to attainment of previously established goals, the goals do tend to become upgraded. This seems to be one of the main messages of Edward Banfield's book, *The Unheavenly City*.[5] Banfield contends that our cities are not really as bad off as one might think. The quality of our nation's housing is steadily improving, people are living longer, real *per capita* income for all races has risen steadily. Yet many people remain dissatisfied. We have simply upgraded our goals, and the higher we raise our aspirations, the more difficult it is to reach these aspirations. What Banfield says may be at least partly correct; life in the USA is probably more comfortable and satisfying for more people than it is anywhere else or has been ever before. But that does not keep some from being deeply concerned about such problems as the status of our cities and minority groups.

In an attempt to reach whatever goals have been selected, strategies have to be developed. Strategies are generally considered to be a mix of policies (stated in terms of detailed goals), plans and programmes.

One of the primary problems for policy-making is the perceived mismatch between goals and objectives. This is easily resolved if we have simply one goal. However, in real life, the policy-maker has a multiplicity of goals and a limited amount of resources. Today there are no known analytical approaches for evaluating trade-offs at the highest policy levels (eg, health versus defence), nor can analysis shed much light on trade-offs within a given social area (eg, health, education or welfare). Consequently, policy-making at its present level of sophistication includes a large element of pragmatism and thus requires the judgement and experience of those keenly sensitive to the workings of the social system.

Despite all of these problems, there are some possible means of assisting policy-making to become more scientific. Specifically, there are tools to help the policy-maker and the academic to build the bridge between conceptual goals and indicators on the one hand and operational ones on the other. One such tool is simulation, which allows exploration of policy options. STAPOL (State Policy) is a simulation, recently developed at the Institute for the Future,

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designed to demonstrate the impact of policy, values, and technological and societal developments upon the quality of life within a hypothetical state (known as Statos). By simulating the evaluation of policies in terms of social indicators, STAPOL has been known to provide some insight into the possible future application of such indicators in real-world policy planning and analysis.

What is STAPOL?

STAPOL is a gaming-simulation that models important aspects of political decision-making at the state level. It is possible for the entire exercise, or any of its parts, to be performed either manually or by computer. When human players are used in STAPOL, they may be asked to take on one of three roles: state legislator, societal evaluator, or exogenous-event assessor. From the point of view of any of these roles, each player is concerned with the ongoing quality of life in Statos, the imaginary state where the events of the game take place. The quality of life is a multi-dimensional concept, encompassing a wide range of areas such as the quality of the environment, the quality of health care, the quality of education, and so on. To measure the quality of life at a given time, one can simply ask people how satisfied they are with each of the above areas. In STAPOL, a set of indices of satisfaction monitors the quality of life in Statos throughout the game. The actual play of the game focuses on the attempts of the state legislators to increase, through legislative actions, the level of the indices. The index levels, in turn, are set by the combined efforts of the societal evaluators, who judge the impact of legislative actions on various societal groups, and the exogenous-event assessors, who determine how certain societal and technological events affect conditions in Statos independent of the actions of the planners.

The game proceeds in rounds or interactions, each of which involves activity on the part of all three types of players. Each round is the equivalent of one biennium (two-year period). The state legislators, representing competing constituencies, first establish a set of legislative objectives and then, working within certain budgetary constraints, develop an operating and a planning legislative programme, each consisting of several legislative actions designed to meet the overall objectives. The societal evaluators, representing four different societal sectors, then rate the impact of each selected legislative action on the satisfaction levels of the various societal groups, as measured by the satisfaction indices, on a scale of +10 to −10. Finally, the exogenous-event assessors perform a similar rating function for each of a set of external events whose occurrence has been determined by chance in accordance with the realistic probabilities associated with these events in previous forecasting studies done at the Institute for the Future. These evaluations and assessments are then used to compute a new set of values for the indices of satisfaction in Statos. In accordance with these new values and a new operating budget, the state legislators create for the second biennium a new set of legislative objectives, a new legislative programme to meet these objectives, and a new planning programme. The objectives may or may not vary from those developed at the start of the first iteration. If the objectives have been retained in part or whole, the legislative

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tive programme for the second round may be derived in large part from the planning programme prepared in the first round.

To clarify this entire procedure, Figure 1 shows the relationships between the various phases of STAPOL.

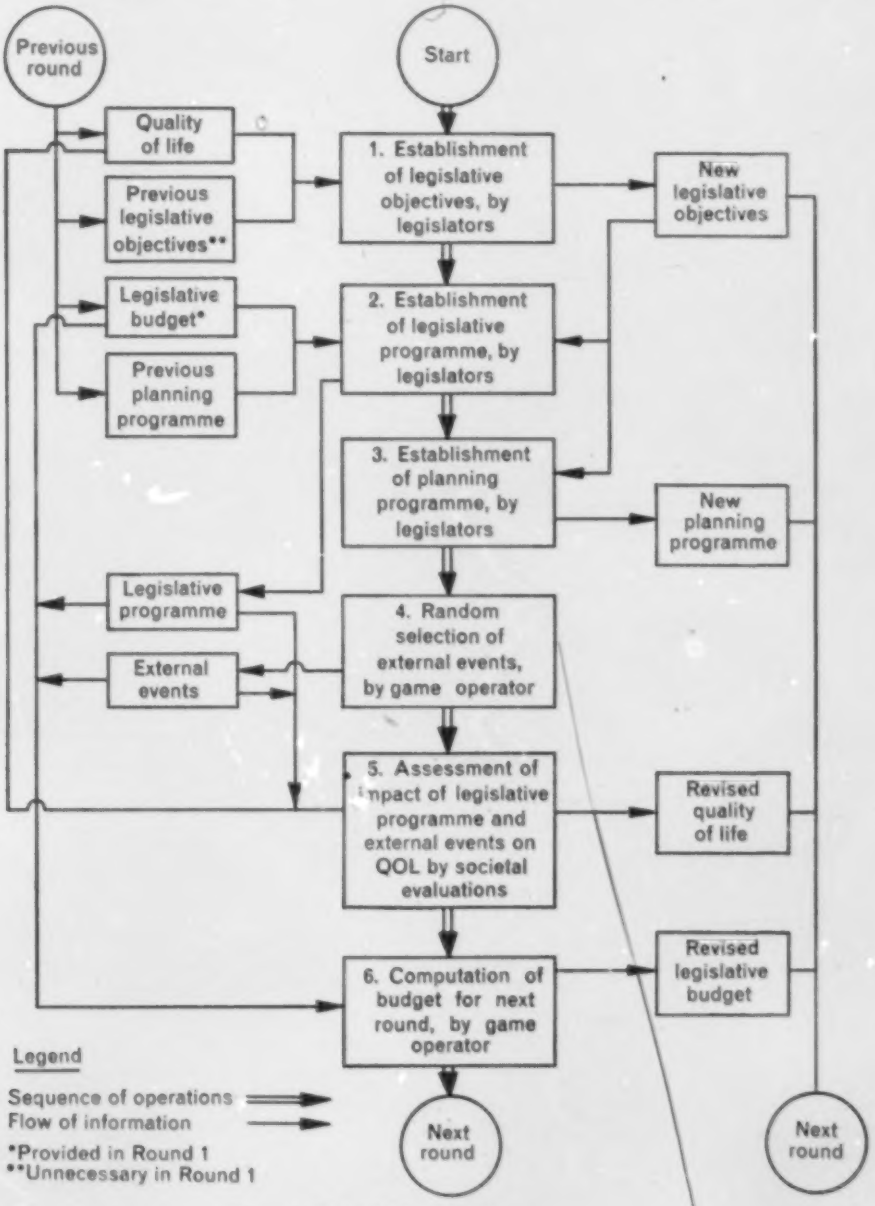
Previous round
Start
Quality of life
Previous legislative objectives**
1. Establishment of legislative objectives, by legislators
New legislative objectives
Legislative budget*
Previous planning programme
2. Establishment of legislative programme, by legislators
3. Establishment of planning programme, by legislators
New planning programme
Legislative programme
External events
4. Random selection of external events, by game operator
5. Assessment of impact of legislative programme and external events on QOL by societal evaluations
Revised quality of life
6. Computation of budget for next round, by game operator
Revised legislative budget
Legend
Sequence of operations
Flow of information
*Provided in Round 1
**Unnecessary in Round 1
Next round
Next round

Figure 1. STAPOL flow diagram.

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The player-roles in STAPOL

The action in STAPOL covers a ten-year time span, broken up into five rounds. The legislative team must produce two legislative programme-sets each round, an operating set for the current biennium and a planning set for the ensuing one. It should be noted that some basic governmental services and activities in Statos are assumed to go on independently of the efforts of the planners (unless the legislators as part of the game explicitly reduce the level of these services). Thus, for example, sanitation services of an average efficiency can be assumed present in Statos even if no specific appropriation is made to that effect. The legislative programmes in the game represent, for the most part, increments to the typical minimum functions of a state government.

For each member of the legislative team, the first step is to define the objectives of the legislative programme he wants to create. These objectives should relate directly to the current quality of life in Statos, a description of which will be provided at the beginning of each round, as illustrated in Figure 2. Typical goals might be to maximise the satisfaction of certain societal groups, or minimise the dissatisfaction of certain groups, or bring all groups closer to the average; the player is of course free to try any approach he desires. The goals or objectives are the goals of the legislature and should be arrived at by consensus or, if this is not possible, by majority vote. It is permissible for any individual or coalition to issue a minority report.

Having defined the objectives, the legislature's next function is to develop an operating set of legislative programmes for the first biennium. This is done by majority vote, drawing from a prepared list of candidate legislation provided in an appendix to the players' game manual. The budget for the first biennium is $60 million, and the total cost of the legislative programmes in the first operating programme-set must not exceed this sum. Any revenue generated by legislative action is not available until the next biennium. A typical legislative programme is shown in Figure 3.

After the operating programme-set has been prepared, a planning legislative programme-set must also be completed. Such a planning set may consist of any or all of the following:

- Carry-over items: programmes already put into effect in a previous operating set which require continued funding throughout several rounds for the programme to be completed or to remain operating.
- New items from the prepared list: programmes contained in the appendix to the player's game manual, but not yet utilised.
- Original items: new programmes proposed by any member by the legislative team.

The budget available to fund an operating programme-set varies to some extent from year to year in accordance with the drift of a generally growing economy and the revenue generated from legislative actions. The success or failure of the previous operating set to improve the quality of life in Statos may also have an influence on the determination of the budget. Keeping these facts in mind, each legislative player must estimate the prospective budget for the next biennium and use that sum as the basis for selecting his planning programme-set.

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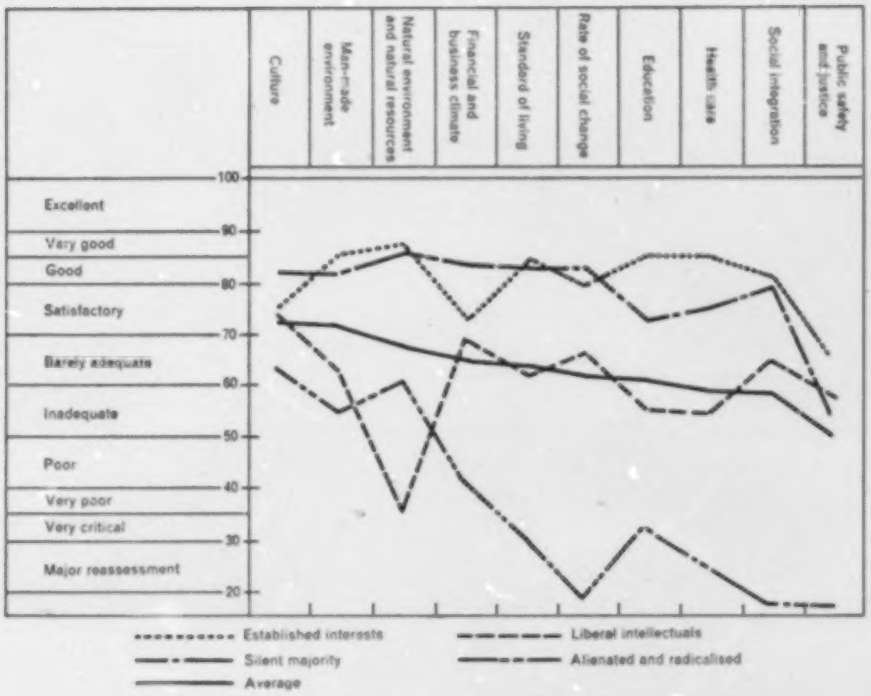

Figure 2. Current 'quality of life' in Status.

FORM B: LEGISLATIVE PROGRAMME

Area	*No.*	*Brief description*	*Dollars in thousands*	*Members supporting this legislation*
I	14	Set up community information centres	150	3–2
I	21	Data bank for state planning	40	5–0
I	61	Improve educational requirements for state and local police	2 500	4–1
I	65	Establish an office for the investigation and prosecution of organised crime	5 000	4–1
I	68	Provision of separate detention facilities for juveniles	10 000	3–2
II	14	Vigorously enforce health and safety standards in housing	2 000	3–2
II	32	Reform building codes to accept technological innovations	250	4–1
II	53	Provide advanced mass transit systems in five urban areas	250	4–1
IV	14	Institute high school work-study programmes	100	5–0
IV	18	Raise salaries of teachers	5 000	5–0
IV	28	Performance contracts for teachers of inner-city schools—pilot programme	2 000	5–0
VI	11	Comprehensive anti-pollution programme	10 000	4–1
VI	40	Provide public pools in urban areas	600	
VI	43	Keep school recreation areas open after school hours	600	3–2
VI	45	Provide wildlife reserves	2 000	3–2

Number of players: 5 Team number: 4 Sub-total: 40 490
Date of play: 10–9

Figure 3. Sample legislative programme.

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As was the case with the operating set, the final planning set is adopted by a majority vote by all the members of the legislature. The set is then recorded and given to the game operator. When all materials from the first round have been processed, the legislature will receive from the operator a computer print-out showing their previous legislative programme, the external events which have occurred, the old and new values of the indices of satisfaction for each societal sector in Statos and for the state as a whole, the new budget for round two, and the previously submitted planning programme. If, in view of the effects of their round-one operating programme-set, the legislature feels their objectives will be furthered by the round-one planning set and if the cost of the latter and the available revenue from the new budget are commensurate, the round-one planning programme-set may become the new operating programme-set. Otherwise, a different operating set may have to be prepared. In either case, the play of the game proceeds into the new biennium, with the legislature once again responsible for the creation of an operating and a planning legislative programme-set.

Societal evaluators

Any significant social change will probably have different implications for members of different sub-groups in society. This statement holds true particularly for changes wrought by government programmes. The over-all impact of a legislative action in raising people's satisfaction with some area of life is determined in a complex fashion. Certain things, for example, are more important to people in one socio-economic class than to those in other classes. In addition, where a given improvement is made in some area, the access of various people to this improvement—the marginal benefit they can derive from it—may differ depending on their respective social positions. Even though things may seem to be getting better for everyone, if one group sees that things are not improving as fast for it as for some other group, members of the first group may have a sense of relative deprivation and so be unhappy.

It is evident therefore that various societal sectors may disagree on how a given legislative action will affect the quality of life in their state. STAPOL recognises this fact of political reality and provides for the expression of several points of view in evaluating the success of the work of the legislature. Specifically, reference to four socio-political segments of society is built into the structure of the game. These segments—the conservative established interests, the liberal intellectuals, the silent majority, and the alienated and radicalised—essentially embrace most if not all of a typical state's socio-political structure and are described in detail in the game manual. Each of the legislative actions and external developments used as part of STAPOL is evaluated from the point of view of each socio-political group in turn. An interdisciplinary team of experts has prepared a set of such ratings and entered them in the computer for use if the evaluation process in the game is to be automated on a given run. However, players of STAPOL may also be asked to take on the role of societal evaluators and provide ratings for the legislative actions chosen in the programmes of the state planners.

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Each member of the evaluators team will have to judge the impact of a number of legislative actions on one or more indices of satisfaction, from the point of view of one or more societal sectors. For example, one player might be responsible for evaluating how a set of actions alters the satisfaction of the silent majority with health care, the standard of living, and education. The number of indices and sectors assigned to each player depends on the number of players.

Each legislative action is to be rated on a scale of +10 to −10 for each index of satisfaction. A +10 indicates maximum gain in a certain socio-political group's satisfaction with the area of life to which the particular index applies; a −10 indicates maximum loss. A zero is used if a particular legislative action is felt to have no effect on satisfaction with the given area of life.

When all team members have performed their assigned functions, the results are recorded and given to the game operator.

Exogenous-event assessors

It is obvious that legislative actions are not the only factors that lead to change in the quality of life in a state. To recognise the existence of other factors and so provide a certain amount of realism to STAPOL, a number of potential external events (technological and societal) are built into the game structure (see Table 1). Some of the events may occur in each iteration of the game, or in some iterations none of them may occur. The happening or non-happening of an external event is determined by chance in accordance with a probability assigned on the basis of previous Institute studies or with the assistance of a group of young radicals in Cambridge.

If an event occurs, it has a direct effect on the values of the indices of satisfaction produced in a given round, raising or lowering them where appropriate. For each of the events in the prepared list in the game manual, such changes have been estimated by an interdisciplinary group of experts, for use in STAPOL whenever the role of exogenous-event assessor is to be performed automatically. The occurrence or non-occurrence of certain events may relate to possible policy actions. For example, if there is a smoke-in at the Stacos state capitol to protest existing marijuana laws, does the legislature crack down on the demonstrators or liberalise existing laws? If there is no protest, does that imply that the existing laws are adequate?

Current utility of STAPOL

To date, STAPOL has been used by university officials, students, officials in state and local government, directors of various poverty programmes, and various federal officials. In general, participants in STAPOL agree that the exercise teaches or illustrates to the participant a number of points. Some of these are:

- the need to think in terms of goals or objectives
- the fact that programme costs vary over time
- the fact that programme costs frequently rise more rapidly than available revenue

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TABLE 1. POSSIBLE EXTERNAL DEVELOPMENTS

1. *Massive new cities programme*, for rebuilding existing cities and creating new communities, funded at rate of $30 (USA) billion per year.
2. *Negative income tax*, to ensure that all persons or families in USA have incomes above poverty level.
3. *Bombing of chemical plant* near major urban centre in Status.
4. *Multi-state regional authorities*, with strong enforcing powers and funds for 90% of costs of programmes they create. Programmes planned in areas of housing, transportation, flood control, etc.
5. *Decrease in national defence budget by half*, to less than 5% of GNP; major redirection of resources to urban programmes.
6. *USA entry into limited Vietnam-like war*, to be imagined as lasting more than six months and requiring commitment of more than 100 000 men, causing cutback on funds available for urban programmes.
7. *Federal programmes to fund all local welfare costs.*
8. *National educational network*, offering courses at many levels, via government-provided home communications terminals; students may receive degree credit without attending conventional institutions.
9. *Abandonment of residence as basis of national franchise*; instant referenda and public opinion monitoring through new devices permit each individual a role in shaping public policy; shift from representative to pure democracy.
10. *Widespread creation of government child-care centres*, with broad popular acceptance, allowing mothers to return to work shortly after giving birth.
11. *Reorganisation of political parties*, producing new alignments as liberal or conservative.
12. *Establishment of national programme for assessment of educational achievement*, coupled with an extensive programme of federal scholarship aid to individual students.
13. *Major sit-in at utility company*, against construction of polluting power plant in SW corner of Status.
14. *Decline of the family as the basic unit of society*, evidenced by a national study showing a significant percentage of the population living in unconventional arrangements (eg, communal groups).
15. *Funding of communiversities in many cities.*
16. *Personality control drugs.*
17. *Household robots.*
18. *Limited weather control.*
19. *Ageing control.*
20. *General immunisation.*
21. *High-IQ computers.*
22. *Cheap electricity from controlled nuclear power.*
23. *Demonstration by an ecology group, blocking major urban avenues of City X*, to push mayor to prohibit cars in the central city.
24. *Smoke-in* on 4 July at the state capital to protest state marijuana laws.
25. *Public-school strike* protesting the adoption of open (unstructured) classes and radical curriculum (eg, courses on imperialism, racism, sexism).
26. *Illegal rent strike* in major urban city in Status, seeking to promote a massive construction programme of low-income housing under community control. The strike is supported by 20% of the city's population.
27. *Major hospital strike* by physicians and nurses to protest the condition of public hospitals in Status.
28. *Cheap mass-produced housing.*
29. *Sit-in by welfare clients and social workers*, at the Federal Building at the state capital, seeking higher benefits. Sit-in results in violence, police retaliation, mass arrests, and the death of two welfare mothers and a social worker.
30. *Bombing of ROTC office* at state university, by radical groups.

- the fact that there are competing priorities for limited resources
- the need to put creative or constructive ideas into the form of policy
- the fact that policy programmes may have different impacts upon different societal sectors
- the importance of analysing and attempting to control events exogenous to the policy process
- the operationalisation of a modified PPBS system

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- the need to develop decision-making skills in an environment which involves uncertainty (external events) and restraints (budget)
- the potential usefulness of social indicators and indices of satisfaction.

As a pedagogical tool for use in the university classroom or for training exercises, STAPOL has experienced notable success.

Some caveats

A recent post-simulation experiment conducted by the author at the Federal Executive Institute in Charlottesville, Virginia, provided strong indications that social indicators are not yet a fully usable tool in policy making.[6] Some of the experiment's results are shown in Figure 4.[7]

For this experiment, several questions were posed to eleven federal career executives who were just completing an eight week training programme, which included participation in STAPOL. The questions included the following: What indicators are important to your quality of life? Are they measurable? What scales would you use to measure them? How much weight would you attach to each of them, letting the summation of all factors equal 100? As a starting point, the respondents were asked to use the indicators provided in the STAPOL Game Manual.[8] Our list of indicators expanded quickly from 10 to 19 with some indicators being applicable to everyone's QOL and others being meaningful to only three or four of the executives. The values placed on each indicator were quite dispersed, ranging, for example, from 3½ to 15 or from 5 to 20. With limited economic resources available to the public policy-maker, this information does not help make the decision: instead, it makes it clear that an improvement in one societal sector's quality of life may not be an improvement for all sectors. For example, an improvement in educational facilities or the pupil : teacher ratio in a state does not improve an individual's quality of life unless he places a value on education. With limited resources, and different

Indicator	Meaningful?		Measurable?		Relative weight	
	Yes	No	Yes	No	Median*	Range
Education	11	0	11	0	14	10-25
Health care	10	1	10	1	11	9-20
Standard of living	8	3	8	3	10	5-20
Public safety and justice	10	1	11	0	10	5-12
Financial and business climate	10	1	11	0	10	5-10
Natural environment—natural resources	11	0	8	3	8½	3½-15
Social integration	10	1	5	5	7½	5-15
Man-made environment	10	1	7	4	8	5-12½
Rate of social change	3	8	1	9	5	4-10
Culture	10	1	4	7	8	1-10

* The summation of the medians does not approximate 100, for only the original ten indicators are shown. Participants added another nine indicators and assigned weights to these which ranged from 5 to 50.

Figure 4. Evaluation of selected social indicators.

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values assigned to each quality of life indicator by the various members of even a fairly homogenous group, how does the policy-maker determine where he will get the most for his money? To questions of this sort, STAPOL provides no ready answers.

A wishful future

Despite the current limitations of STAPOL, it is important in policy matters to think in terms of goals and indicators. The President's Commission on National Goals which reported in 1960 had very modest goals. However, their combined aspirations exceeded the national capacity to satisfy them. The National Planning Association calculated that the cost of realising the rather modest national goals set by the Eisenhower administration would exceed the total GNP. New York's Mayor Lindsay has estimated that the cost of eliminating New York City's slums would exceed $100 (USA) billion.

With limited resources available, the 1960 Goals Commission simply failed to assign priorities to their aspirations, and consequently their goals were not reasonable. Moreover, in many instances, progress towards goal attainment could not be measured, since there were no corresponding sets of indicators available.

STAPOL forces the policy maker to think in terms of realistic goals and methods for attaining them. As the societal-evaluator portion of the model becomes tuned more closely to reality, STAPOL or a similar simulation may become a real tool for exploration of policy options. One possible way to do this would be to have each major societal group generate what they perceive to be proper national or state goals and then propose a consistent set of policies to meet its own perceived goals. These could be tested on a societal model to derive estimates of what societal conditions would result if the policies were implemented, in terms of appropriate social indicators. If the model were fully developed, the different policies suggested by each societal sector might, after attempts to reach closer consensus, then be presented as a range of options and possible outcomes accompanied by a 'contrast analysis' comparing outcomes and revealing implicit trade-offs. In this way, the level of debate over national goals and policies might be raised considerably. The results of this process would, it seems reasonable to hope, provide an expanded range of alternative policies and a better understanding of the implications of policy choices in terms of their impact on various societal sectors.

Conclusions

This paper has been primarily descriptive and therefore the conclusions, if any, are few. It seems clear that the practical application of social indicators to policy formulation and analysis is still for the future. Nevertheless, tools such as STAPOL can provide the policy-maker with a good acclimatisation to many of the necessary concepts and techniques. At least in this pedagogical sense, then, policy analysis gaming-simulations such as STAPOL can help in laying groundwork for sorely needed improvements in the policy-planning process.

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1. For further detail, the reader should refer to Norman C. Dalkey, Ralph Lewis, and David Snyder, *Measurement and Analysis of the Quality of Life: With Exploratory Illustrations of Applications to Career and Transportation Choices* (Santa Monica, RAND, 1970)
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   These writings vary in their definition of social indicator. This variance increases the complexity involved in shifting from a conceptual model to an operational one. Normally in making such a transition the conceptual model has been fairly well established; with regard to social indicators this is not the fact.
3. US Commission on National Goals, *Goals for Americans: Programs for Action in the Sixties* (Englewood Cliffs, New Jersey, Prentice-Hall, 1960)
4. US National Goals Research Staff, *Toward Balanced Growth: Quantity with Quality* (Washington, DC, US Government Printing Office, 1970)
5. Edward Banfield, *The Unheavenly City* (Boston, Little, Brown and Company, 1970)
6. The author wishes to express his appreciation to Dr Frank Sherwood, Executive Director, Federal Executive Institute, for permission to print the results of this experiment.
7. To a large extent this experiment draws on the work of Norman Dalkey cited earlier.
8. Dennis L. Little, Richard Rochberg, and Richard Feller, *STAPOL: Simulation-Game Manual*, Working Paper WP-13, Institute for the Future, March 1971

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